EUR 2551.e

EUROPEAN ATOMIC ENERGY COMMUNITY — EURATOM

FLUB-A 7090 PROGRAM FOR THE DETERMINATION OF LATTICES BUCKLING BY FLUX-MAPPING

by

R. DI COLA (S.P.Q.A., Milan)

1965

Joint Nuclear Research Center
Ispra Establishment — Italy

Scientific Data Processing Center — CETIS

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$$\Phi = A\ J_o\ (\beta r)\ \sin\ (\alpha z - \gamma)$$

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Summary

The aim of the FLUB program is the data processing of ECO flux mapping measurements. The first part of the program makes the different foil activity corrections (background, deadtime of counts, radioactive decay). The second part fits the corrected values to a function of the form:

$$\Phi = A\ J_o\ (\beta r)\ \sin\ (\alpha z - \gamma)$$

Introduction (°)

This program was written at the request and with the help of Mr. H. HETTINGER and Mr. C. LANDES of the Reactor Physic Departement, to determine the lattice buckling in the ECO reactor. The method of measurement of the flux will be described below. The different corrections to the measured values and the least square fit of the corrected data to a function of the form:

$$\Phi = A\, J_o(\beta r)\, \sin\,(\alpha\, z - \gamma)$$

will be given.

I. Method of measurement

The flux-mapping of the reactor is performed by irradiation of dysprosium detection foils placed in aluminium pipes which are vertically introduced in the reactor.

Each position is characterized by the identification number of the relative foil, the values of r and z and the weight-factor w of the foil.

II. Counting of the foils

The foils are counted by an 8-channel automatic counting device. 8 foils are counted simultaneously during a pre-set time. After the end of this time the result for the 8 foils are printed and punched on a tape. The rotating disk supporting the foils then turns to the next position and the next counting begins. After eight countings the result is given in the following form:

(°) Manuscript received on August 30, 1965

t_1^1 t_2^1

$A^1_{n_1}$ $A^1_{(n+1)2}$ ..... $A^1_{(n+7)8}$

t_1^2 t_2^2

$A^2_{(n+7)1}$ A^2_{n2} ..... $A^2_{(n+6)8}$

---

t_1^8 t_2^8

$A^8_{(n+1)1}$ $A^8_{(n+2)2}$ ..... A^8_{n8}

The term A^K_{Ni} represents the result of the "K-th" counting of the foil "N", which is done by the counter "i" t_1^K, and t_2^K are the beginning and end times of the "K-th" counting.

A reference foil placed on the first channel for the first counting of each of run eight foils is used to avoid errors due to changes in temperature, high tension and so on. The result of this foil is not used for the least square fit of the data.

III. Corrections to the measured values

The corrections are made in 4 steps.

1) The value A^K_{Ni} is divided by the counting time $t^K_2 - t^K_1$.
(This is not an exact treatment but the error is eliminated by the ratio to the reference foil).

$$A^K_{Ni}\ * = \frac{A^K_{Ni}}{t^K_2 - t^K_1}$$

2) Dead-time corrections.
Each channel has a particular dead-time τ_i. Thus the correction is made using the same value of τ_i for one column of A.

$$A^K_{Ni}\ ** = A^K_{Ni}\ * \times \frac{1}{1 - \tau_i\ A^K_{Ni}\ *}$$

3) Background correction.
A constant value of the background is given for the eight channels.

$$A^K_{Ni}\ *** = A^K_{Ni}\ ** - A_o$$

4) Decay correction.

The result is finally:

$$A^K_{Ni}\ **** = A^K_{Ni}\ *** \times \frac{\lambda\ e^{\lambda t^K_2}\ (t^K_1 - t^K_2)}{1 - e^{\lambda\ (t^K_2 - t^K_1)}}$$

IV. Presentation of the corrected data and determination of the "Φ - values"

The corrected data A^{K}_{Ni} **** are given in the same form as the counting data. The eight results of each foil are placed on a diagonal of the matrix. These eight results are added and the final result is divided by the weight factor W_N of the foil. Normalization is performed by dividing all the results by the first one, which is the result of the reference foil.

V. Least square fit of the corrected data

We have now a list of normalized values of the flux and the corresponding $\underline{r}$ and $\underline{z}$ values. The least square fit of these values to

$$\Phi_i = A\, J_o(\beta r)\, \sin(\alpha z - \gamma)$$

gives the values of A, β, α, γ.
The numerical method used for solving this problem is described in the appendix of the reference [1].

VI. Description and method of use of the Fortran program FLUB for use on 7090

The program consists of a main program and 3 subroutines. All programs are written in the Fortran II language.

1. Main program :

   a) reads and writes the input data;
   b) makes counting- time corrections;
   c) makes dead-time corrections;
   d) makes background corrections;
   e) makes decay corrections;
   f) corrects the data and determines the Phi-values;
   g) prints partial results

2. Subroutine ROD :

   a) performs the iterations for the non-linear least square fit;
   b) writes final results

3. Subroutine SSC :

   Computes the solution of linear system equations.

4. Subroutine SIMH :

   Performs matrix inversion

VII. How to Use FLUB

Data to be input to FLUB is prepared through the use of the DOCA program 63/11 (047 PHN) on an IBM 047 Tape Controlled Card Punch. See reference page 11
This program punches cards from a 5 channel paper-tape. The cards may then be used as input data to FLUB on the 7090.

1. Input description

Data is read from logical tape 5.
The input deck is composed of 3 cards containing the constant values to be used throughout the calculation followed by sets of 12 cards containing the values to be used for each counting, followed by a card signalling the end of the set.
A number of sets of 13 cards form a problem. Several problem can be run consecutively

The end of a problem is signaled by a FINE card in place of the usual 13th card.

The FINE card is then followed by a card containing values to be used to calculate the last squares fit. This final card may then be followed anew with groups of 13 cards for another problem, and so on.

The following table describes the form in which the cards are to be supplied.

DATA CARDS

	SYMBOL	DESCRIPTION	FORMAT
	Card 1		
constant values	VL, AO	Constant value of disintegration, constant value of the background	E 10.6
	Cards 2-3		
	TAU_i i = 1,8	Values for the correction of the dead time	E 10.6
		1st set of counting	
set of 13 cards	Card 1		
	FE_i i = 1,8	Number of the foil	F 7.0
	Card 2		
	RR_i i = 1,8	Radial coordinates of flux monitors	F 7.0
	Card 3		
	ZZ_i i = 1,8	Axial coordinates of flux monitors	F 7.0
	Card 4		
	w_i i = 1,8	Weight-factor of the foil	F 7.0
	Card 5		
	T_1^1, T_2^1, A_j^1 j = 1,8	The beginning (T_1) and end times (T_2), and the values of the counting (A_j^i)	F 7.0
	Card 12		
	T_1^8, T_2^8, A_j^8, j = 1,8	" " " " " " " "	"
	Card 13		
	***	Card to signal the end of the set of counting	A 4

	SYMBOL	DESCRIPTION	FORMAT
Set of 13 cards	Card 1 .... Card 13 ***	2nd set of counting	
Set of 13 cards	Card 1 .... Card 13	n^{th} set of counting	
	FINE	Card to signal the end of a problem	A 4
	Card 1 AO ALFO BETO GAMO	Initial approximation of A, α, β, γ,	F 6.3
	PREC	The precision	E 10.4
	IT	Number of iterations	I 6
2nd Problem	Cards 2-3 TAU_i i = 1,8 Card 1 .... Card 13 Card 1 .... Card 13		

2. Output description

The results are written on logical tape 6 which is printed off line. Output is in the form:

a) All input variables and constants;
b) The initial matrix A_{Ni}^{K} and the resulting matrix A_{Ni}^{K****} after the corrections;
c) The sums of the diagonal values of the matrix and the normalized sums;
d) The values r and z with their corresponding Φ values;
e) A_o, β_o, α_o, γ_o (last approximation of A, β, α, γ) ρ, $\delta\beta$, $\delta\alpha$, $\delta\gamma$ (last correction to A, β, α, γ) ;
f) Number of iteration, flux values, flux values approximation, radial coordinates, axial coordinates.

An example of the output can be found at the end of this description.

3. Composition of a complete input deck:

```
$   ID
$   XEQ
    FLUB DECK *
$   DATA

    INPUT DATA CARDS N. 1,2,3  (VL, AO, TAU_i)
    SET of 12 cards
    Set of 12 cards
1st SET of 12 cards
Problem FINE
    Card with AO, ALFO, BETO, GAMO, PREC, IT

    INPUT DATA CARDS 2,3  (TAU_i)
    SET of 12 cards
    ***
2nd Set of 12 cards
Problem ***
    .
    .
    .
    FINE
    Card with AO, ALFO, BETO, GAMO, PREC, IT

    End of File
```

* The binary deck FLUB can be obtained from the CETIS library

Reference

[1] M. Cocchi - G. Di Cola
Statistical study of the effects of measurement errors on the extrapolation radius and height calculations for a cylindrical reactor.
Joint Nuclear Research Center - Ispra - Italy EUR 1624 e. (1964)

[2] Marthan, Vanhamel
DOCA Program 63/11 (047 PHN) on an IBM 047 Tape Controlled Card Punch. [not available]

```
*      XEQ                                                                    FLUB0001
*      LABEL                                                                  FLUB0002
CMAIN                                                                         FLUB0003
C      ***  PROGRAM FOR THE DETERMINATION OF LATTICES BUCKLING                FLUB0004
C           BY FLUX - MAPPING  ***                                            FLUB0005
C                                                                             FLUB0006
C                                                                             FLUB0007
C                                                                             FLUB0008
      DIMENSION W(8),A(8,8),T1(8),T2(8),K(8),AP(8),RR(8),ZZ(8),R( 200),ZFLUB0009
     1( 200),FI( 200),TAU(8),FE(8),APP(8)                                     FLUB0010
B     FINE=263145256060                                                       FLUB0011
      REWIND 9                                                                FLUB0012
      READ INPUT TAPE 5,310,VL,AO                                             FLUB0013
      READ INPUT TAPE 5,310,(TAU(I),I=1,8)                                    FLUB0014
      WRITE OUTPUT TAPE 6,99,VL,AO,(TAU(I),I=1,8)                             FLUB0015
   10 KN=0                                                                    FLUB0016
   15 READ INPUT TAPE 5,320,(FE(I),I=1,8)                                     FLUB0017
      READ INPUT TAPE 5,320,(RR(I),I=1,8),(ZZ(I),I=1,8),(W(I),I=1,8)         FLUB0018
      READ INPUT TAPE 5,102,(T1(I),T2(I),(A(I,J),J=1,8),I=1,8)               FLUB0019
      READ INPUT TAPE 5,500,AST                                               FLUB0020
      WRITE OUTPUT TAPE 6,218                                                 FLUB0021
      WRITE OUTPUT TAPE 6,220,(FE(I),T1(I),T2(I),(A(I,J),J=1,8),RR(I),        FLUB0022
     1ZZ(I),W(I),I=1,8)                                                       FLUB0023
C                                                                             FLUB0024
C                                                                             FLUB0025
C                                                                             FLUB0026
C      ***  CORRECTION TO THE MEASURED VALUES  ***                           FLUB0027
C                                                                             FLUB0028
C                                                                             FLUB0029
      DO 12 I=1,8                                                             FLUB0030
      DO 12 J=1,8                                                             FLUB0031
C                                                                             FLUB0032
C     ***  COUNTING TIME CORRECTION   ***                                     FLUB0033
      A(I,J)=A(I,J)/(T2(I)-T1(I))                                             FLUB0034
C                                                                             FLUB0035
C     ***  DEAD-TIME CORRECTION   ***                                         FLUB0036
      A(I,J)=A(I,J)/(1.-TAU(J)*A(I,J))                                        FLUB0037
C                                                                             FLUB0038
C     ***  BACKGROUND CORRECTION  ***                                         FLUB0039
   12 A(I,J)=A(I,J)-AO                                                        FLUB0040
C                                                                             FLUB0041
C     ***  DECAY CORRECTION  ***                                              FLUB0042
      DO 20 I=1,8                                                             FLUB0043
```



```
      EX=(VL*EXPF(VL*T1(I)))*(T2(I)-T1(I))                                    FLUB0044
      EX=EX/(1.-EXPF(-VL*(T2(I)-T1(I))))                                      FLUB0045
      DO 20 J=1,8                                                             FLUB0046
   20 A(I,J)=A(I,J)*EX                                                        FLUB0047
C                                                                             FLUB0048
C                                                                             FLUB0049
C     ***  CORRECTION OF THE DATA END DETERMINATION OF                        FLUB0050
C          THE PHI - VALUES  ***                                              FLUB0051
      DO 35 I=1,8                                                             FLUB0052
      K(I)=0                                                                  FLUB0053
      AP(I)=0                                                                 FLUB0054
      JJ=0                                                                    FLUB0055
      DO 30 J=I,8                                                             FLUB0056
      JJ=JJ+1                                                                 FLUB0057
      IF(A(JJ,J))25,30,25                                                     FLUB0058
   25 K(I)=K(I)+1                                                             FLUB0059
      AP(I)=AP(I)+A(JJ,J)                                                     FLUB0060
   30 CONTINUE                                                                FLUB0061
   35 CONTINUE                                                                FLUB0062
      DO 50 I=2,8                                                             FLUB0063
      JJ=0                                                                    FLUB0064
      DO 45 J=I,8                                                             FLUB0065
      JJ=JJ+1                                                                 FLUB0066
      II=10-I                                                                 FLUB0067
      IF(A(J,JJ))40,45,40                                                     FLUB0068
   40 K(II)=K(II)+1                                                           FLUB0069
      AP(II)=AP(II)+A(J,JJ)                                                   FLUB0070
   45 CONTINUE                                                                FLUB0071
   50 CONTINUE                                                                FLUB0072
C                                                                             FLUB0073
C                                                                             FLUB0074
      DO 60 I=1,8                                                             FLUB0075
      AP(I)=(AP(I)/FLOATF(K(I)))/W(I)                                         FLUB0076
      APP(I)=AP(I)/AP(1)                                                      FLUB0077
      IF(ABSF(APP(I)-1.)-1.E-05)60,60,56                                      FLUB0078
   56 KN=KN+1                                                                 FLUB0079
      FI(KN)=APP(I)                                                           FLUB0080
      R(KN)=RR(I)                                                             FLUB0081
      Z(KN)=ZZ(I)                                                             FLUB0082
   60 CONTINUE                                                                FLUB0083
C                                                                             FLUB0084
C                                                                             FLUB0085
C                                                                             FLUB0086
```

```
      WRITE OUTPUT TAPE 6,219                                                    FLUB0087
      WRITE OUTPUT TAPE 6,220,(FE(I),T1(I),T2(I),(A(I,J),J=1,8),RR(I),          FLUB0088
     1ZZ(I),W(I),I=1,8)                                                         FLUB0089
      WRITE OUTPUT TAPE 6,200,(AP(I),I=1,8)                                      FLUB0090
      WRITE OUTPUT TAPE 6,201,(APP(I),I=1,8)                                     FLUB0091
B     IF((-(AST*FINE))*(AST+FINE))15,150,15                                      FLUB0092
  150 NSTA=0                                                                     FLUB0093
      DO 165 I=1,KN                                                              FLUB0094
      IF(NSTA)155,155,160                                                        FLUB0095
  155 NSTA=NSTA+60                                                               FLUB0096
      WRITE OUTPUT TAPE 6,400                                                    FLUB0097
  160 WRITE OUTPUT TAPE 6,405,I,R(I),Z(I),FI(I)                                  FLUB0098
      WRITE OUTPUT TAPE 9,505,R(I),Z(I),FI(I),I                                  FLUB0099
  165 NSTA=NSTA-1                                                                FLUB0100
C                                                                                FLUB0101
C     ***  SUBROUTINE FOR THE LEAST SQUARE FIT  ***                              FLUB0102
      CALL ROD (R,Z,FI,KN)                                                       FLUB0103
C                                                                                FLUB0104
      GO TO 10                                                                   FLUB0105
C                                                                                FLUB0106
C                                                                                FLUB0107
   99 FORMAT (1H1/////20X,7HLAMBDA=,E20.8,10X,3HA0=,E20.8////60X,3HTAU//FLUB0108
     11H ,1P8E16.7)                                                              FLUB0109
  310 FORMAT (7E10.6)                                                            FLUB0110
  320 FORMAT (8F7.0 )                                                            FLUB0111
  500 FORMAT (A4)                                                                FLUB0112
  505 FORMAT (3E20.8,12X,I8)                                                     FLUB0113
  102 FORMAT (10F7.0 )                                                           FLUB0114
  200 FORMAT (1H /////22H SUMS OF THE DIAGONALS/1H ,1P8E16.7)                    FLUB0115
  201 FORMAT (1H /////16H NORMALIZED SUMS/1H ,1P8E16.7)                          FLUB0116
  219 FORMAT (1H0////9H    FOILS,1X,2HT1,3X,2HT2,34X,16HRESULTANT MATRIXFLUB0117
     1,40X,1HR,7X,1HZ,7X,1HW///)                                                 FLUB0118
  218 FORMAT (1H1,9H    FOILS,1X,2HT1,3X,2HT2,36X,14HINITIAL MATRIX,36X,FLUB0119
     11HR,7X,1HZ,7X,1HW///)                                                      FLUB0120
  220 FORMAT (1H0,F8.0,2F5.0,5X,8F9.0,3X,3F8.0)                                  FLUB0121
  400 FORMAT (1H1,2X,1HN,8X,1HR,9X,1HZ,18X,2HFI//)                               FLUB0122
  405 FORMAT (1H ,I4,2F10.0,E20.8)                                               FLUB0123
      END                                                                        FLUB0124
```



```
*     LABEL                                                                      FLUB0125
CROD                                                                             FLUB0126
      SUBROUTINE ROD (R,Z,FI,M)                                                  FLUB0127
      DIMENSION Z(100),R(100),A(100,4),Y(100),FI(100),X(4),FIC(100)              FLUB0128
C                                                                                FLUB0129
      M1=M-1                                                                     FLUB0130
      DO 10 I=1,M                                                                FLUB0131
      R(I)=R(I)/1000.                                                            FLUB0132
   10 Z(I)=Z(I)/1000.                                                            FLUB0133
      PG=3.1415926                                                               FLUB0134
      READ INPUT TAPE 5,11,A0,ALFO,BETO,GAMO,PREC,IT                             FLUB0135
   11 FORMAT (4F6.3,E10.4,I6)                                                    FLUB0136
      DO 50 ITER=1,IT                                                            FLUB0137
      X(1)=1.                                                                    FLUB0138
      X(2)=0.                                                                    FLUB0139
      X(3)=0.                                                                    FLUB0140
      X(4)=0.                                                                    FLUB0141
      RO=1.                                                                      FLUB0142
      ROA=RO*A0                                                                  FLUB0143
      DO 30 I=1,M                                                                FLUB0144
      AZG=ALFO*Z(I)-GAMO                                                         FLUB0145
      SAZG=SINF(AZG)                                                             FLUB0146
      CAZG=COSF(AZG)                                                             FLUB0147
      BOR=BETO*R(I)                                                              FLUB0148
      BESI=BJ1F(BOR)                                                             FLUB0149
      BESO=BJ0F(BOR)                                                             FLUB0150
      SBI=BESI*SAZG                                                              FLUB0151
      SBO=BESO*SAZG                                                              FLUB0152
      CBI=BESI*CAZG                                                              FLUB0153
      CBO=BESO*CAZG                                                              FLUB0154
      A(I,1)=A0*SBO                                                              FLUB0155
      A(I,2)=-ROA*R(I)*SBI                                                       FLUB0156
      A(I,3)=ROA*Z(I)*CBO                                                        FLUB0157
   30 A(I,4)=-ROA*CBO                                                            FLUB0158
      CALL SSC(A,FI,X,4,M)                                                       FLUB0159
      A0=A0*X(1)                                                                 FLUB0160
      BETO=X(2)+BETO                                                             FLUB0161
      ALFO=X(3)+ALFO                                                             FLUB0162
      GAMO=X(4)+GAMO                                                             FLUB0163
      SUM=0.                                                                     FLUB0164
      DO 40 I=1,M                                                                FLUB0165
   40 SUM=SUM+(FI(I)-A(I,1))**2                                                  FLUB0166
      Q=SQRTF(SUM/FLOATF(M1))                                                    FLUB0167
```

```
      IF(Q-PREC)55,55,50                                                FLUB0168
   50 ITER=ITER                                                         FLUB0169
   55 WRITE OUTPUT TAPE 6,110,A0,BETO,ALFO,GAMO                         FLUB0170
      WRITE OUTPUT TAPE 6,120,(X(II),II=1,4)                            FLUB0171
      NS=0                                                              FLUB0172
      DO 70 I=1,M                                                       FLUB0173
      IF(NS)60,60,65                                                    FLUB0174
   60 NS=NS+60                                                          FLUB0175
      WRITE OUTPUT TAPE 6,150,ITER                                      FLUB0176
   65 WRITE OUTPUT TAPE 6,200,R(I),Z(I),FI(I),A(I,1)                    FLUB0177
  200 FORMAT (4E25.8)                                                   FLUB0178
   70 NS=NS-1                                                           FLUB0179
  110 FORMAT (1H1,30X,21HLAST APPROXIMATION OF/1H0,17X,2HA ,18X,4HBETA,1FLUB0180
     16X,5HALFHA,16X,5HGAMMA/6X,4E20.8)                                 FLUB0181
  120 FORMAT (1H0///31X,18HLAST CORRECTION TO/1H0,17X,2HA ,18X,4HBETA,16FLUB0182
     1X,5HALFHA,16X,5HGAMMA/6X,4E20.8)                                  FLUB0183
  150 FORMAT (1H1/30X,12HITERATION N.,I6///                             FLUB0184
     117X,1HR,24X,1HZ,23X,3HFHI,18X,11HFHI APPROX.)                     FLUB0185
      RETURN                                                            FLUB0186
      END                                                               FLUB0187
```



```
*     LABEL                                                             FLUB0188
CSSC                                                                    FLUB0189
      SUBROUTINE SSC(A,B,X,N,M)                                         FLUB0190
      DIMENSION A(100,4),B(100),X(4),AT(4,4),AM(4,4),C(4)               FLUB0191
      DO 10 K=1,N                                                       FLUB0192
      DO 10 J=1,N                                                       FLUB0193
      AM(K,J)=0.                                                        FLUB0194
      DO 10 I=1,M                                                       FLUB0195
   10 AM(K,J)=AM(K,J)+A(I,K)*A(I,J)                                     FLUB0196
      CALL SIMH(AM,AT,4,1)                                              FLUB0197
      DO 15 J=1,N                                                       FLUB0198
      C(J)=0.                                                           FLUB0199
      DO 15 I=1,M                                                       FLUB0200
   15 C(J)=C(J)+A(I,J)*B(I)                                             FLUB0201
      DO 20 K=1,N                                                       FLUB0202
      X(K)=0.                                                           FLUB0203
      DO 20 J=1,N                                                       FLUB0204
   20 X(K)=X(K)+AT(K,J)*C(J)                                            FLUB0205
      RETURN                                                            FLUB0206
      END                                                               FLUB0207
```



```
*     LABEL                                                             FLUB0208
CSIMH                                                                   FLUB0209
      SUBROUTINE SIMH(A,AT,N,ITER)                                      FLUB0210
      DIMENSION A(4 ,4 ),AT(4 ,4 )                                      FLUB0211
    1 DO 2 I=1,N                                                        FLUB0212
      DO 2 J=1,N                                                        FLUB0213
    2 AT(I,J)=A(J,I)                                                    FLUB0214
      DET=1.                                                            FLUB0215
      DO 80 IL=1,ITER                                                   FLUB0216
      DO 80 I=1,N                                                       FLUB0217
      C=0.                                                              FLUB0218
      DO 10 K=1,N                                                       FLUB0219
   10 C=C+A(I,K)*AT(K,I)                                                FLUB0220
      IF(C)20,555,20                                                    FLUB0221
   20 DET=DET*C                                                         FLUB0222
      DO 30 J=1,N                                                       FLUB0223
   30 AT(J,I)=AT(J,I)/C                                                 FLUB0224
      DO 70 J=1,N                                                       FLUB0225
      IF(J-I)40,70,40                                                   FLUB0226
   40 H=0.                                                              FLUB0227
      DO 50 K=1,N                                                       FLUB0228
   50 H=H+A(I,K)*AT(K,J)                                                FLUB0229
      DO 60 K=1,N                                                       FLUB0230
   60 AT(K,J)=AT(K,J)-H*AT(K,I)                                         FLUB0231
   70 CONTINUE                                                          FLUB0232
   80 CONTINUE                                                          FLUB0233
      RETURN                                                            FLUB0234
  555 PAUSE 555                                                         FLUB0235
      CALL EXIT                                                         FLUB0236
      END                                                               FLUB0237
```

LAMBDA= 0.50249999E-02 AO= 0.09999999E 01

TAU

9.9999999E-14 9.9999999E-14 9.9999999E-14 9.9999999E-14 9.9999999E-14 9.9999999E-14 9.9999999E-14 9.9999999E-14

FOILS T1	T2	INITIAL MATRIX							R	Z	W
0. 1.	2.	999999.	78560.	76118.	69020.	57920.	43850.	28079.	18497.	0.	0.	1.
1. 3.	4.	18312.	989999.	77774.	75357.	68330.	57341.	43411.	27798.	0.	320.	1.
12. 5.	6.	27520.	18129.	980099.	76996.	74603.	67647.	56768.	42977.	240.	320.	1.
23. 7.	8.	42547.	27245.	17948.	970298.	76226.	73857.	66971.	56200.	480.	320.	1.
34. 9.	10.	55638.	42122.	26973.	17771.	960595.	75454.	73118.	66301.	720.	320.	1.
45. 11.	12.	65638.	55082.	41701.	26703.	17593.	950989.	74709.	72387.	960.	320.	1.
56. 13.	14.	71663.	64892.	54531.	41284.	26436.	17417.	941479.	73962.	1200.	320.	1.
66. 15.	16.	73222.	70946.	64332.	53986.	40871.	26172.	17243.	932064.	1200.	1920.	1.

FOILS T1	T2	RESULTANT MATRIX							R	Z	W
0. 1.	2.	1007564.	79153.	76693.	69541.	58357.	44181.	28290.	18636.	0.	0.	1.
1. 3.	4.	18636.	1007563.	79153.	76693.	69541.	58357.	44180.	28290.	0.	320.	1.
12. 5.	6.	28290.	18636.	1007563.	79153.	76693.	69542.	58358.	44180.	240.	320.	1.
23. 7.	8.	44180.	28290.	18636.	1007562.	79153.	76693.	69542.	58357.	480.	320.	1.
34. 9.	10.	58357.	44180.	28291.	18639.	1007562.	79142.	76692.	69542.	720.	320.	1.
45. 11.	12.	69542.	58358.	44181.	28290.	18639.	1007562.	79152.	76692.	960.	320.	1.
56. 13.	14.	76692.	69446.	58358.	44181.	28290.	18638.	1007561.	79152.	1200.	320.	1.
66. 15.	16.	79152.	76692.	69542.	58358.	44180.	28291.	18639.	1007561.	1200.	1920.	1.

SUMS OF THE DIAGONALS
1.0075622E 06 7.9151276E 04 7.6692341E 04 6.9529644E 04 5.8357508E 04 4.4180453E 04 2.8290465E 04 1.8637316E 0

NORMALIZED SUMS
1.0000000E 00 7.8557212E-02 7.6116732E-02 6.9007794E-02 5.7919510E-02 4.3848860E-02 2.8078133E-02 1.8497435E-0

FOILS T1	T2	INITIAL MATRIX							R	Z	W
0. 17.	18.	922743.	47752.	46270.	41953.	35206.	26653.	178013.	113990.	0.	0.	1.
11. 19.	20.	112850.	913516.	47274.	45807.	41533.	34854.	26386.	176233.	0.	1920.	1.
22. 21.	22.	174471.	111721.	904381.	46801.	45349.	41118.	34505.	26122.	240.	1920.	1.
33. 23.	24.	25861.	172726.	110604.	895337.	46333.	44896.	40707.	34160.	480.	1920.	1.
44. 25.	26.	33818.	25602.	171000.	109498.	886384.	45870.	44447.	40300.	720.	1920.	1.
55. 27.	28.	39897.	33480.	25364.	169290.	108403.	877521.	45411.	44003.	960.	1920.	1.
54. 29.	30.	43563.	39498.	33145.	25093.	167597.	107319.	868746.	44957.	960.	1760.	1.
65. 31.	32.	44507.	43127.	39103.	32814.	24842.	165921.	106246.	860059.	1200.	1760.	1.

FOILS T1	T2	RESULTANT MATRIX							R	Z	W
0. 17.	18.	1007560.	52140.	50522.	45808.	38441.	29102.	194375.	124467.	0.	0.	1.
11. 19.	20.	124467.	1007560.	52140.	50522.	45808.	38441.	29101.	194375.	0.	1920.	1.
22. 21.	22.	194375.	124466.	1007560.	52139.	50522.	45808.	38441.	29101.	240.	1920.	1.
33. 23.	24.	29101.	194375.	124466.	1007559.	52139.	50522.	45808.	38441.	480.	1920.	1.
44. 25.	26.	38440.	29101.	194376.	124466.	1007559.	52140.	50522.	45808.	720.	1920.	1.
55. 27.	28.	45808.	38440.	29122.	194376.	124466.	1007560.	52139.	50523.	960.	1920.	1.
54. 29.	30.	50523.	45808.	38440.	29101.	194376.	124466.	1007560.	52139.	960.	1760.	1.
65. 31.	32.	52139.	50522.	45808.	38441.	29101.	194376.	124466.	1007560.	1200.	1760.	1.

UMS OF THE DIAGONALS
1.0075598E 06 5.2139490E 04 5.0522162E 04 4.5808081E 04 3.8440500E 04 2.9103837E 04 1.9437535E 04 1.2446629E 05

ORMALIZED SUMS
1.0000000E 00 5.1748285E-02 5.0143092E-02 4.5464380E-02 3.8152079E-02 2.8885469E-02 1.9291694E-01 1.2353241E-01

FOILS	T1	T2	INITIAL MATRIX								R	Z	W
0.	33.	34.	851459.	315623.	305814.	277294.	232700.	176172.	112810.	216965.	0.	0.	1.
2.	35.	36.	214795.	842944.	312467.	302755.	274521.	230373.	174410.	111582.	0.	480.	1.
13.	37.	38.	110565.	212647.	834515.	309342.	299727.	271776.	228069.	172666.	240.	480.	1.
24.	39.	40.	170939.	109459.	210521.	826170.	306249.	296730.	269058.	225788.	480.	480.	1.
35.	41.	42.	223530.	169230.	108364.	208416.	817908.	303187.	293763.	266367.	720.	480.	1.
46.	43.	44.	263703.	221295.	167538.	107280.	206332.	809729.	300155.	290825.	960.	480.	1.
57.	45.	46.	287913.	261066.	219082.	165863.	106207.	204269.	801636.	297153.	1200.	480.	1.
43.	47.	48.	294181.	285034.	258455.	216891.	164204.	105145.	202226.	793620.	720.	1760.	1.

FOILS	T1	T2	RESULTANT MATRIX								R	Z	W
0.	33.	34.	1007560.	373487.	361879.	328131.	275361.	208469.	133491.	256741.	0.	0.	1.
2.	35.	36.	256741.	1007560.	373487.	361878.	328130.	275361.	208469.	133491.	0.	480.	1.
13.	37.	38.	133491.	256740.	1007560.	373486.	361877.	328131.	275360.	208469.	240.	480.	1.
24.	39.	40.	208468.	133490.	256741.	1007560.	373487.	361878.	328130.	275360.	480.	480.	1.
35.	41.	42.	275360.	208469.	133490.	256741.	1007559.	373487.	361878.	328129.	720.	480.	1.
46.	43.	44.	328129.	275360.	208469.	133489.	256741.	1007559.	373487.	361877.	960.	480.	1.
57.	45.	46.	361872.	328129.	275360.	208470.	133489.	256742.	1007564.	373486.	1200.	480.	1.
43.	47.	48.	373485.	361873.	328128.	275359.	208469.	133489.	256741.	1007564.	720.	1760.	1.

SUMS OF THE DIAGONALS
1.0075605E 06 3.7348646E 05 3.6187660E 05 3.2812966E 05 2.7536012E 05 2.0846905E 05 1.3348987E 05 2.5674102E

NORMALIZED SUMS
1.0000000E 00 3.7068391E-01 3.5916117E-01 3.2566746E-01 2.7329388E-01 2.0690475E-01 1.3248820E-01 2.5481450E

FOILS	T1	T2	INITIAL MATRIX								R	Z	W
0.	49.	50.	785684.	271544.	263106.	238567.	494575.	479200.	434510.	364633.	0.	0.	1.
10.	51.	52.	360987.	777827.	268829.	260475.	236184.	489629.	474408.	430165.	0.	1760.	1.
21.	53.	54.	425863.	357377.	770049.	266141.	257870.	233822.	484733.	469664.	240.	1760.	1.
32.	55.	56.	464967.	421604.	353803.	762349.	263480.	255291.	231484.	479886.	480.	1760.	1.
3.	57.	58.	475087.	460317.	417388.	350265.	754726.	260845.	252738.	229169.	0.	640.	1.
14.	59.	60.	226877.	470336.	455714.	413206.	346762.	747179.	258237.	250211.	240.	640.	1.
25.	61.	62.	247709.	224608.	465633.	451157.	409074.	343294.	739707.	255655.	480.	640.	1.
36.	63.	64.	253098.	245232.	222362.	460977.	446645.	404983.	339861.	732310.	720.	640.	1.

FOILS	T1	T2	RESULTANT MATRIX								R	Z	W
0.	49.	50.	1007564.	348228.	337407.	305938.	634244.	614527.	557216.	467606.	0.	0.	1.
10.	51.	52.	467606.	1007563.	348228.	337407.	305942.	634243.	614527.	557216.	0.	1760.	1.
21.	53.	54.	557216.	467606.	1007563.	348229.	337407.	305941.	634244.	614527.	240.	1760.	1.
32.	55.	56.	614526.	557215.	467605.	1007563.	348229.	337406.	305941.	634244.	480.	1760.	1.
3.	57.	58.	634243.	614525.	557215.	467605.	1007564.	348229.	337406.	305941.	0.	640.	1.
14.	59.	60.	305940.	634243.	614525.	557204.	467604.	1007564.	348229.	337406.	240.	640.	1.
25.	61.	62.	337406.	305940.	634243.	614525.	557204.	467604.	1007563.	348230.	480.	640.	1.
36.	63.	64.	348229.	337406.	305940.	634244.	614525.	557203.	467604.	1007563.	720.	640.	1.

SUMS OF THE DIAGONALS
1.0075632E 06 3.4822883E 05 3.3740640E 05 3.0594047E 05 6.3424352E 05 6.1452590E 05 5.5721104E 05 4.6760495E

NORMALIZED SUMS
1.0000000E 00 3.4561485E-01 3.3487366E-01 3.0364393E-01 6.2948258E-01 6.0991297E-01 5.5302835E-01 4.6409488E

FOILS T1 T2 INITIAL MATRIX R Z W

0.	65.	66.	724987.	254729.	163122.	215480.	248467.	259094.	246406.	211543.	0.	0.	1.
47.	67.	68.	209428.	717737.	252182.	161491.	213325.	245982.	256503.	243942.	960.	640.	1.
58.	69.	70.	241503.	207334.	710560.	249660.	159876.	211192.	243522.	253938.	1200.	640.	1.
59.	71.	72.	251399.	239088.	205261.	703454.	247163.	158277.	209080.	241087.	1200.	800.	1.
60.	73.	74.	238676.	248885.	236697.	203208.	696419.	244691.	156694.	206989.	1200.	960.	1.
61.	75.	76.	204919.	236289.	246396.	234330.	201176.	689455.	242244.	155127.	1200.	1120.	1.
62.	77.	78.	153576.	202870.	233926.	243932.	231987.	199164.	682560.	239822.	1200.	1280.	1.
63.	79.	80.	237424.	152040.	200841.	231587.	241493.	229667.	197172.	675734.	1200.	1440.	1.

FOILS T1 T2 RESULTANT MATRIX R Z W

0.	65.	66.	1007563.	354013.	226700.	299466.	345310.	360079.	342446.	293994.	0.	0.	1.
47.	67.	68.	293995.	1007562.	354013.	226701.	299465.	345310.	360079.	342446.	960.	640.	1.
58.	69.	70.	342446.	293995.	1007562.	354013.	226700.	299466.	345309.	360079.	1200.	640.	1.
59.	71.	72.	360079.	342446.	293996.	1007561.	354012.	226700.	299465.	345309.	1200.	800.	1.
60.	73.	74.	345309.	360079.	342446.	293995.	1007560.	354011.	226700.	299465.	1200.	960.	1.
61.	75.	76.	299465.	345309.	360079.	342446.	293995.	1007560.	354011.	226699.	1200.	1120.	1.
62.	77.	78.	226700.	299465.	345308.	360079.	342446.	293994.	1007559.	354012.	1200.	1280.	1.
63.	79.	80.	354012.	226699.	299464.	345309.	360079.	342446.	293994.	1007558.	1200.	1440.	1.

SUMS OF THE DIAGONALS
1.0075607E 06 3.5401210E 05 2.2669987E 05 2.9946522E 05 3.4530907E 05 3.6007899E 05 3.4244592E 05 2.9399469E 05

NORMALIZED SUMS
1.0000000E 00 3.5135560E-01 2.2499872E-01 2.9721804E-01 3.4271788E-01 3.5737696E-01 3.3987621E-01 2.9178855E-01

FOILS T1 T2 INITIAL MATRIX R Z W

0.	81.	82.	668977.	145467.	310514.	358050.	373363.	355075.	304840.	227168.	0.	0.	1.
64.	83.	84.	224896.	662287.	144012.	307409.	354469.	369629.	351524.	301792.	1200.	1600.	1.
48.	85.	86.	298774.	222647.	655664.	142572.	304335.	350924.	365933.	348009.	960.	800.	1.
49.	87.	88.	344529.	295786.	220421.	649107.	141146.	301292.	347415.	362274.	960.	960.	1.
50.	89.	90.	358651.	341084.	292828.	218217.	642616.	139735.	298279.	343941.	960.	1120.	1.
51.	91.	92.	340502.	355064.	337673.	289900.	216035.	636190.	138338.	295296.	960.	1280.	1.
52.	93.	94.	292343.	337097.	351513.	334296.	287001.	213875.	629828.	136955.	960.	1440.	1.
53.	95.	96.	135585.	289420.	333726.	347998.	330955.	284131.	211736.	623530.	960.	1600.	1.

FOILS T1 T2 RESULTANT MATRIX R Z W

0.	81.	82.	1007558.	219089.	467670.	539265.	562328.	534784.	459124.	342141.	0.	0.	1.
64.	83.	84.	342140.	1007558.	219089.	467670.	539264.	562327.	534784.	459125.	1200.	1600.	1.
48.	85.	86.	459124.	342140.	1007557.	219089.	467670.	539263.	562328.	534784.	960.	800.	1.
49.	87.	88.	534784.	459124.	342141.	1007556.	219088.	467670.	539263.	562328.	960.	960.	1.
50.	89.	90.	562327.	534784.	459123.	342141.	1007556.	219089.	467670.	539263.	960.	1120.	1.
51.	91.	92.	539264.	562326.	534784.	459124.	342141.	1007556.	219089.	467670.	960.	1280.	1.
52.	93.	94.	467669.	539264.	562326.	534783.	459123.	342141.	1007555.	219090.	960.	1440.	1.
53.	95.	96.	219089.	467670.	539263.	562325.	534786.	459123.	342141.	1007555.	960.	1600.	1.

SUMS OF THE DIAGONALS
1.0075565E 06 2.1908903E 05 4.6766983E 05 5.3926373E 05 5.6232690E 05 5.3478391E 05 4.5912384E 05 3.4214070E 05

NORMALIZED SUMS
1.0000000E 00 2.1744591E-01 4.6416240E-01 5.3521936E-01 5.5810956E-01 5.3077314E-01 4.5568051E-01 3.3957472E-01

FOILS	T1	T2	INITIAL MATRIX								R	Z	W
0.	97.	98.	617295.	378458.	436500.	455060.	432770.	371542.	276880.	450980.	0.	0.	1.
37.	99.	100.	446470.	611122.	374673.	432135.	450539.	428442.	367827.	274111.	720.	800.	1.
38.	101.	102.	271370.	442005.	605011.	370926.	427814.	446004.	424158.	364149.	720.	960.	1.
39.	103.	104.	360508.	268654.	437585.	598961.	367217.	423536.	441544.	419916.	720.	1120.	1.
40.	105.	106.	415717.	356903.	265967.	433209.	592971.	363545.	419301.	437129.	720.	1280.	1.
41.	107.	108.	432758.	411560.	353334.	263307.	428877.	587041.	359910.	415108.	720.	1440.	1.
42.	109.	110.	410957.	428430.	407444.	349801.	260674.	424598.	581171.	356311.	720.	1600.	1.
26.	111.	112.	352748.	406847.	424146.	403370.	346303.	258067.	420342.	575360.	480.	800.	1.

FOILS	T1	T2	RESULTANT MATRIX								R	Z	W
0.	97.	98.	1007556.	617723.	712460.	742753.	706371.	606434.	451926.	736094.	0.	0.	1.
37.	99.	100.	736093.	1007555.	617722.	712459.	742752.	706371.	606435.	451925.	720.	800.	1.
38.	101.	102.	451925.	736093.	1007555.	617721.	712460.	742752.	706371.	606435.	720.	960.	1.
39.	103.	104.	606436.	451921.	736092.	1007555.	617721.	712460.	742752.	706370.	720.	1120.	1.
40.	105.	106.	706370.	606435.	451920.	736092.	1007554.	617721.	712460.	742753.	720.	1280.	1.
41.	107.	108.	742753.	706370.	606435.	451919.	736092.	1007553.	617722.	712460.	720.	1440.	1.
42.	109.	110.	712460.	742752.	706369.	606436.	451919.	736091.	1007553.	617722.	720.	1600.	1.
26.	111.	112.	617722.	712459.	742752.	706370.	606435.	451919.	736091.	1007554.	480.	800.	1.

SUMS OF THE DIAGONALS
1.0075544E 06 6.1772161E 05 7.1245944E 05 7.4275247E 05 7.0637027E 05 6.0643513E 05 4.5192181E 05 7.3609223

NORMALIZED SUMS
1.0000000E 00 6.1309006E-01 7.0711756E-01 7.3718346E-01 7.0107405E-01 6.0188818E-01 4.4853339E-01 7.3057315

FOILS	T1	T2	INITIAL MATRIX								R	Z	W
0.	113.	114.	569607.	479844.	500367.	475860.	408536.	304447.	529200.	551838.	0.	0.	1.
27.	115.	116.	546320.	563911.	475046.	495364.	471101.	404451.	301403.	523908.	480.	960.	1.
28.	117.	118.	518669.	540857.	558272.	470296.	490410.	466390.	400406.	298389.	480.	1120.	1.
29.	119.	120.	295405.	513482.	535448.	552689.	465593.	485506.	461726.	396402.	480.	1280.	1.
30.	121.	122.	392438.	292451.	508348.	530094.	547162.	460937.	480651.	457109.	480.	1440.	1.
31.	123.	124.	452538.	388506.	289526.	503265.	524794.	541691.	456328.	475844.	480.	1600.	1.
16.	125.	126.	471086.	448013.	384621.	286631.	498232.	519546.	536274.	451765.	240.	960.	1.
17.	127.	128.	447247.	466375.	443533.	380775.	283765.	493250.	514351.	530911.	240.	1120.	1.

FOILS	T1	T2	RESULTANT MATRIX								R	Z	W
0.	113.	114.	1007555.	848777.	885079.	841729.	722642.	538523.	936081.	976124.	0.	0.	1.
27.	115.	116.	976124.	1007555.	848777.	885080.	841728.	722643.	538524.	936080.	480.	960.	1.
28.	117.	118.	936080.	976124.	1007555.	848778.	885079.	841728.	722642.	538524.	480.	1120.	1.
29.	119.	120.	538523.	936079.	976123.	1007554.	848777.	885079.	841728.	722642.	480.	1280.	1.
30.	121.	122.	722641.	538523.	936080.	976124.	1007553.	848777.	885079.	841728.	480.	1440.	1.
31.	123.	124.	841728.	722627.	538522.	936081.	976125.	1007554.	848777.	885077.	480.	1600.	1.
16.	125.	126.	885078.	841728.	722627.	538522.	936080.	976125.	1007553.	848777.	240.	960.	1.
17.	127.	128.	848776.	885077.	841728.	722627.	538523.	936080.	976125.	1007553.	240.	1120.	1.

SUMS OF THE DIAGONALS
1.0075539E 06 8.4877700E 05 8.8507837E 05 8.4172813E 05 7.2263630E 05 5.3852312E 05 9.3608015E 05 9.7612440

NORMALIZED SUMS
1.0000000E 00 8.4241345E-01 8.7844267E-01 8.3541744E-01 7.1721848E-01 5.3448565E-01 9.2906297E-01 9.6880613

FOILS T1 T2 INITIAL MATRIX R Z W

0.	129.	130.	525602.	437070.	423490.	484267.	415750.	309821.	319757.	429080.	0.	0.	1.
4.	131.	132.	424789.	520346.	432699.	419255.	479424.	411592.	306723.	316559.	0.	800.	1.
15.	133.	134.	313393.	420541.	515143.	428372.	415062.	474630.	407476.	303656.	240.	800.	1.
18.	135.	136.	300619.	310259.	416336.	509992.	424088.	410909.	469884.	403401.	240.	1280.	1.
19.	137.	138.	399367.	297616.	307156.	412173.	504892.	419847.	406830.	465185.	240.	1440.	1.
20.	139.	140.	460533.	395373.	294640.	304084.	408051.	499843.	415649.	402732.	240.	1600.	1.
9.	141.	142.	398725.	455928.	391419.	291694.	301043.	403970.	494845.	411493.	0.	1600.	1.
8.	143.	144.	407378.	394738.	451369.	387505.	288777.	298033.	399930.	489897.	0.	1440.	1.

FOILS T1 T2 RESULTANT MATRIX R Z W

0.	129.	130.	1007553.	837841.	811809.	928315.	796971.	593910.	612957.	822524.	0.	0.	1.
4.	131.	132.	822524.	1007552.	837840.	811808.	928314.	796970.	593911.	612956.	0.	800.	1.
15.	133.	134.	612955.	822523.	1007553.	837840.	811807.	928314.	796970.	593911.	240.	800.	1.
18.	135.	136.	593910.	612955.	822524.	1007553.	837839.	811802.	928315.	796969.	240.	1280.	1.
19.	137.	138.	796969.	593916.	612954.	822524.	1007553.	837838.	811802.	928314.	240.	1440.	1.
20.	139.	140.	928313.	796968.	593916.	612953.	822523.	1007552.	837839.	811802.	240.	1600.	1.
9.	141.	142.	811843.	928314.	796967.	593917.	612952.	822522.	1007553.	837840.	0.	1600.	1.
8.	143.	144.	837839.	811843.	928314.	796967.	593916.	612953.	822521.	1007553.	0.	1440.	1.

SUMS OF THE DIAGONALS
1.0075526E 06 8.3783931E 05 8.1181425E 05 9.2831417E 05 7.9696873E 05 5.9391327E 05 6.1295430E 05 8.2252311E 05

NORMALIZED SUMS
1.0000000E 00 8.3155884E-01 8.0572886E-01 9.2135550E-01 7.9099463E-01 5.8946127E-01 6.0835959E-01 8.1635745E-01

FOILS T1 T2 INITIAL MATRIX R Z W

0.	145.	146.	484998.	465040.	484933.	461178.	383630.	285889.	295053.	395931.	0.	0.	1.
5.	147.	148.	391972.	480148.	460390.	480084.	456566.	379794.	283030.	292102.	0.	960.	1.
6.	149.	150.	289181.	388052.	475347.	455786.	475283.	452000.	375996.	280200.	0.	1120.	1.
7.	151.	152.	277398.	286289.	384171.	470594.	451228.	470530.	447480.	372236.	0.	1280.	1.
19.	153.	154.	368514.	274624.	283426.	380329.	465888.	446716.	465825.	443005.	240.	1440.	1.
20.	155.	156.	438575.	364829.	271878.	280592.	376526.	461227.	442249.	461167.	240.	1600.	1.
9.	157.	158.	456555.	434189.	361181.	269159.	277786.	372759.	456615.	437827.	0.	1600.	1.
8.	159.	160.	433449.	451989.	429847.	357569.	266467.	275008.	369031.	452049.	0.	1440.	1.

FOILS T1 T2 RESULTANT MATRIX R Z W

0.	145.	146.	1007553.	966091.	1007418.	958068.	796967.	593916.	612953.	822521.	0.	0.	1.
5.	147.	148.	822522.	1007552.	966092.	1007418.	958067.	796967.	593915.	612952.	0.	960.	1.
6.	149.	150.	612952.	822521.	1007553.	966091.	1007417.	958066.	796967.	593916.	0.	1120.	1.
7.	151.	152.	593915.	612951.	822519.	1007554.	966091.	1007417.	958066.	796964.	0.	1280.	1.
19.	153.	154.	796967.	593915.	612951.	822519.	1007553.	966091.	1007417.	958065.	240.	1440.	1.
20.	155.	156.	958065.	796967.	593915.	612951.	822519.	1007548.	966091.	1007417.	240.	1600.	1.
9.	157.	158.	1007416.	958064.	796967.	593915.	612951.	822515.	1007548.	966092.	0.	1600.	1.
8.	159.	160.	966092.	1007415.	958063.	796966.	593913.	612950.	822514.	1007548.	0.	1440.	1.

SUMS OF THE DIAGONALS
1.0075513E 06 9.6609117E 05 1.0074168E 06 9.5806565E 05 7.9696671E 05 5.9391495E 05 6.1295133E 05 8.2251862E 05

NORMALIZED SUMS
1.0000000E 00 9.5885061E-01 9.9986656E-01 9.5088524E-01 7.9099369E-01 5.8946375E-01 6.0835744E-01 8.1635410E-01

N	R	Z	FI
1	0.	320.	0.78557212E-01
2	240.	320.	0.76116732E-01
3	480.	320.	0.69007794E-01
4	720.	320.	0.57919510E-01
5	960.	320.	0.43848860E-01
6	1200.	320.	0.28078133E-01
7	1200.	1920.	0.18497434E-01
8	0.	1920.	0.51748285E-01
9	240.	1920.	0.50143091E-01
10	480.	1920.	0.45464380E-01
11	720.	1920.	0.38152079E-01
12	960.	1920.	0.28885469E-01
13	960.	1760.	0.19291694E-00
14	1200.	1760.	0.12353241E-00
15	0.	480.	0.37068391E-00
16	240.	480.	0.35916117E-00
17	480.	480.	0.32566746E-00
18	720.	480.	0.27329388E-00
19	960.	480.	0.20690475E-00
20	1200.	480.	0.13248819E-00
21	720.	1760.	0.25481450E-00
22	0.	1760.	0.34561485E-00
23	240.	1760.	0.33487366E-00
24	480.	1760.	0.30364393E-00
25	0.	640.	0.62948258E 00
26	240.	640.	0.60991297E 00
27	480.	640.	0.55302835E 00
28	720.	640.	0.46409488E-00
29	960.	640.	0.35135560E-00
30	1200.	640.	0.22499872E-00
31	1200.	800.	0.29721804E-00
32	1200.	960.	0.34271788E-00
33	1200.	1120.	0.35737696E-00
34	1200.	1280.	0.33987620E-00
35	1200.	1440.	0.29178856E-00
36	1200.	1600.	0.21744591E-00
37	960.	800.	0.46416240E-00
38	960.	960.	0.53521936E 00
39	960.	1120.	0.55810957E 00
40	960.	1280.	0.53077314E 00
41	960.	1440.	0.45568050E-00
42	960.	1600.	0.33957472E-00
43	720.	800.	0.61309006E 00
44	720.	960.	0.70711756E 00
45	720.	1120.	0.73718347E 00
46	720.	1280.	0.70107405E 00
47	720.	1440.	0.60188818E 00
48	720.	1600.	0.44853339E-00
49	480.	800.	0.73057315E 00
50	480.	960.	0.84241346E 00
51	480.	1120.	0.87844267E 00
52	480.	1280.	0.83541744E 00
53	480.	1440.	0.71721848E 00
54	480.	1600.	0.53448565E 00
55	240.	960.	0.92906207E 00
56	240.	1120.	0.96880613E 00
57	0.	800.	0.83155884E 00
58	240.	800.	0.80572887E 00
59	240.	1280.	0.92135550E 00
60	240.	1440.	0.79099464E 00

N	R	Z	FI
61	240.	1600.	0.58946127E 00
62	0.	1600.	0.60835960E 00
63	0.	1440.	0.81635746E 00
64	0.	960.	0.95885061E 00
65	0.	1120.	0.99986657E 00
66	0.	1280.	0.95088524E 00
67	240.	1440.	0.79099369E 00
68	240.	1600.	0.58946376E 00
69	0.	1600.	0.60835744E 00
70	0.	1440.	0.81635410E 00

LAST APPROXIMATION OF

A	BETA	ALFHA	GAMMA
0.99996671E 00	0.14749872E 01	0.18819800E 01	0.52359020E 00

LAST CORRECTION TO

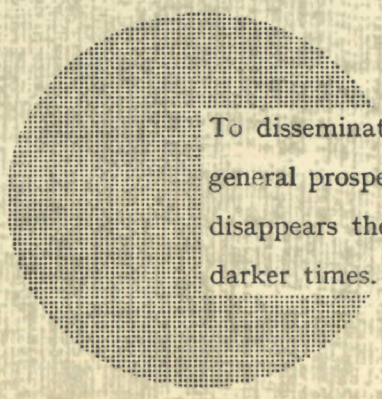
A	BETA	ALFHA	GAMMA
0.09999999E 01	0.31897798E-07	-0.18626451E-07	-0.33527613E-07

ITERATION N. 51

R	Z	FHI	FHI APPROX.
0.	0.31999999E-00	0.78557212E-01	0.78559724E-01
0.23999999E-00	0.31999999E-00	0.76116732E-01	0.76117777E-01
0.48000000E-00	0.31999999E-00	0.69007794E-01	0.69019260E-01
0.72000000E 00	0.31999999E-00	0.57919510E-01	0.57922626E-01
0.95999999E 00	0.31999999E-00	0.43848860E-01	0.43849517E-01
0.12000000E 01	0.31999999E-00	0.28078133E-01	0.28079711E-01
0.12000000E 01	0.19199999E 01	0.18497434E-01	0.18499321E-01
0.	0.19199999E 01	0.51748285E-01	0.51756287E-01
0.23999999E-00	0.19199999E 01	0.50143091E-01	0.50147496E-01
0.48000000E-00	0.19199999E 01	0.45464380E-01	0.45470890E-01
0.72000000E 00	0.19199999E 01	0.38152079E-01	0.38160266E-01
0.95999999E 00	0.19199999E 01	0.28885469E-01	0.28888698E-01
0.95999999E 00	0.17599999E 01	0.19291694E-00	0.19290680E-00
0.12000000E 01	0.17599999E 01	0.12353241E-00	0.12353083E-00
0.	0.48000000E-00	0.37068391E-00	0.37068541E-00
0.23999999E-00	0.48000000E-00	0.35916117E-00	0.35916304E-00
0.48000000E-00	0.48000000E-00	0.32566746E-00	0.32566857E-00
0.72000000E 00	0.48000000E-00	0.27329388E-00	0.27330890E-00
0.95999999E 00	0.48000000E-00	0.20690475E-00	0.20690470E-00
0.12000000E 01	0.48000000E-00	0.13248819E-00	0.13249460E-00
0.72000000E 00	0.17599999E 01	0.25481450E-00	0.25481851E-00
0.	0.17599999E 01	0.34561485E-00	0.34560712E-00
0.23999999E-00	0.17599999E 01	0.33487366E-00	0.33486429E-00
0.48000000E-00	0.17599999E 01	0.30364393E-00	0.30363584E-00
0.	0.63999999E 00	0.62948258E 00	0.62945374E 00
0.23999999E-00	0.63999999E 00	0.60991297E 00	0.60988783E 00
0.48000000E-00	0.63999999E 00	0.55302835E 00	0.55301150E 00
0.72000000E 00	0.63999999E 00	0.46409488E-00	0.46410058E-00
0.95999999E 00	0.63999999E 00	0.35135560E-00	0.35134088E-00
0.12000000E 01	0.63999999E 00	0.22499872E-00	0.22498652E-00
0.12000000E 01	0.80000000E 00	0.29721804E-00	0.29723229E-00
0.12000000E 01	0.95999999E 00	0.34271788E-00	0.34273063E-00
0.12000000E 01	0.11200000E 01	0.35737696E-00	0.35738724E-00
0.12000000E 01	0.12799999E 01	0.33987620E-00	0.33988317E-00
0.12000000E 01	0.14399999E 01	0.29178856E-00	0.29179359E-00
0.12000000E 01	0.16000000E 01	0.21744591E-00	0.21744600E-00
0.95999999E 00	0.80000000E 00	0.46416240E-00	0.46416050E-00
0.95999999E 00	0.95999999E 00	0.53521936E 00	0.53521111E 00
0.95999999E 00	0.11200000E 01	0.55810957E 00	0.55809897E 00
0.95999999E 00	0.12799999E 01	0.53077314E 00	0.53076447E 00
0.95999999E 00	0.14399999E 01	0.45568050E-00	0.45566738E-00
0.95999999E 00	0.16000000E 01	0.33957472E-00	0.33956555E-00
0.72000000E 00	0.80000000E 00	0.61309006E 00	0.61312864E 00
0.72000000E 00	0.95999999E 00	0.70711756E 00	0.70698230E 00
0.72000000E 00	0.11200000E 01	0.73718347E 00	0.73721582E 00
0.72000000E 00	0.12799999E 01	0.70107405E 00	0.70110856E 00
0.72000000E 00	0.14399999E 01	0.60188818E 00	0.60190972E 00
0.72000000E 00	0.16000000E 01	0.44853339E-00	0.44854605E-00
0.48000000E-00	0.80000000E 00	0.73057315E 00	0.73058990E 00
0.48000000E-00	0.95999999E 00	0.84241346E 00	0.84242374E 00
0.48000000E-00	0.11200000E 01	0.87844267E 00	0.87844931E 00
0.48000000E-00	0.12799999E 01	0.83541744E 00	0.83542473E 00
0.48000000E-00	0.14399999E 01	0.71721848E 00	0.71722170E 00
0.48000000E-00	0.16000000E 01	0.53448565E 00	0.53447710E 00
0.23999999E-00	0.95999999E 00	0.92906207E 00	0.92906564E 00
0.23999999E-00	0.11200000E 01	0.96880613E 00	0.96879638E 00
0.	0.80000000E 00	0.83155884E 00	0.83157863E 00
0.23999999E-00	0.80000000E 00	0.80572887E 00	0.80572987E 00
0.23999999E-00	0.12799999E 01	0.92135550E 00	0.92134679E 00
0.23999999E-00	0.14399999E 01	0.79099464E 00	0.79098677E 00

ITERATION N. 51

R	Z	FHI	FHI APPROX.
0.23999999E-00	0.16000000E 01	0.58946127E 00	0.58944719E 00
0.	0.16000000E 01	0.60835960E 00	0.60835735E 00
0.	0.14399999E 01	0.81635746E 00	0.81636255E 00
0.	0.95999999E 00	0.95885061E 00	0.95887115E 00
0.	0.11200000E 01	0.99986657E 00	0.99987650E 00
0.	0.12799999E 01	0.95088524E 00	0.95090467E 00
0.23999999E-00	0.14399999E 01	0.79099369E 00	0.79098677E 00
0.23999999E-00	0.16000000E 01	0.58946376E 00	0.58944719E 00
0.	0.16000000E 01	0.60835744E 00	0.60835735E 00
0.	0.14399999E 01	0.81635410E 00	0.81636255E 00



To disseminate knowledge is to disseminate prosperity — I mean general prosperity and not individual riches — and with prosperity disappears the greater part of the evil which is our heritage from darker times.

Alfred Nobel

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